

of accuracy and means of attaining them with sufficient rapidity to keep them in their place of subserviency to the theory of the experiments. Another excellent point is the treatment of vibration and waves in general.

Prof. Hahn has a firm and broad grip of what has been accomplished on his own subject, not only by his fellow-countrymen, but by students of other nations. A bibliography at the head of each section contains almost all the well-known names among English, French, and American physicists. On p. 3, at the head of Section 2, we find Prof. Perry's excellent book on "Practical Mathematics" noted, and this fact is a significant specimen of the method in which the subject has been approached. A full bibliography at the end of the book contains even such references as the Board of Education syllabuses.

H. C. O'N.

OUR BOOK SHELF.

School Algebra. By W. E. Paterson. Part i., pp. 328+xxxix. Part ii., pp. 333-604+xli-lxxvii. (Oxford: Clarendon Press, 1909.) Price 3s. each with answers; 2s. 6d. each without.

PART I. is, except as regards one or two things, sufficient for students who are not going to specialise in mathematics, and part ii. contains the higher portions which are usually read by scholarship pupils. The author has, however, reserved the ordinary methods of finding the H.C.F. of two expressions and of extracting square roots until part ii., whereas in many cases these methods are taught in preparatory schools. In part i. he has shown the student how to obtain square roots by means of indeterminate coefficients, so that the postponement of the formal method is not a very serious drawback; moreover, the teacher can introduce it if he likes without difficulty, as boys readily learn it. But with regard to H.C.F. the case is different. If the author had, in part i., shown pupils that the H.C.F. is contained in the sum or difference of any multiples of the two given expressions, he would have put a powerful weapon into their hands, quite sufficient for all ordinary cases; but practically all he says is that both expressions must be factorised, the remainder theorem being used for cubic and higher expressions. Graphs are well treated, except that in the diagrams the author omits the minus signs on the negative side of the axes. There are a great many misprints and other inaccuracies, chiefly in part i., some of which are serious; for example, the rule given in Art. 80 (p. 113) is quite wrong as it stands, and even if corrected would be difficult to understand, and would be, moreover, of only partial application.

On the other hand, some of the hints are excellent, as, for example, that it is no use to try to factorise ax^2+bx+c by inspection if b^2-4ac is not a square number (p. 212), a good foreshadowing of the value of the theory.

Part ii. is well done, though in some instances explanations are too condensed; the distinction between permutations and combinations, for instance, is not well explained. But, as a rule, proofs are clear as well as concise, and many important examples are worked out in a very instructive manner.

There is a good index to each part, and a large number of examination papers, including questions in French and German. In the hands of a good teacher the book would be an excellent concise introduction

to all the parts of algebra required for scholarship work; but it would have to be supplemented in places, and it is most desirable that a careful table of errata should be provided as early as possible.

Eliza Brightwen: the Life and Thoughts of a Naturalist. Edited by W. H. Chesson, with introduction and epilogue by E. Gosse. Pp. xxxii+215; plates. (London: T. Fisher Unwin, 1909.) Price 5s. net.

ALTHOUGH in no sense a scientific naturalist—and, indeed, to a great extent ignoring the work of others—Mrs. Brightwen did good service in publishing first-hand accounts of the habits of animals—both in captivity and in the wild state—and thus helping to stay the flood of rubbishy works, compiled by those who had no real knowledge of their subject, which were only too common some twenty years ago. Perhaps the most remarkable feature in her career is the fact that her first, and apparently most successful, work, "Wild Nature Won by Kindness," was not presented to the public until its author had attained her sixtieth year. Throughout her life she had, however, devoted all her spare time to learning all that was possible about every kind of animal that came in her way, whether home or foreign, and this volume was, therefore, the result of long and close observation, and this, too, in a thorough and exhaustive manner. When it is added that this, as well as the five other volumes bearing her name, was written in a bright and attractive manner, it is little wonder that it leapt at once into popularity, and also obtained the honour of being translated into Swedish.

Mrs. Brightwen, who was a daughter of Mr. George Elder, a brother of one of the founders of the firm of Smith, Elder and Co., was born at Banff in 1830, and in the early 'seventies her husband purchased The Grove at Stanmore, where she was soon after left a widow. It was here that all her published works were written, and also much of the MS. of the volume now before us, mainly in the form of a diary, although the earlier portion dates from so far back as 1855. At her death the MS. was left to Mr. Edmund Gosse, with a free hand as to its ultimate disposal.

That he did well in deciding on its publication, under the careful editorship of Mr. Chooson, will, we venture to think, be the verdict of all those who read this charming volume, which, in addition to numberless observations on natural history, gives an instructive insight into the inner life of a striking personality.

R. L.

The Grammar of Life. By G. T. Wrench. Pp. xii +237. (London: William Heinemann, 1908.) Price 6s. net.

PHILOSOPHY is to some a liberation from the positive and dogmatic habit of mind, to others a new field for its exercise. As the title of his book indicates, Mr. Wrench belongs to the latter class. He does, indeed, profess at the beginning a philosophical phenomenalism: "We know only our own perceptions. Consciousness itself depends on previous perceptions; for without memorised perceptions with which to compare our present perceptions, consciousness would not exist." From this quotation it is evident that the infinite series, that nightmare of so many philosophies, has no terrors for Mr. Wrench. But, though without apparent misgiving on this head, he is only verbally constant to his sceptical presupposition. His "relativity" gives us such cardinal propositions as these:—"Man has no ultimate purpose"; "life is a special form of matter in motion"; "the universe is an eternal series of cycles." It is legitimate for a philo-

sopher to deny that we can penetrate the veil of appearance; but for such a one, the words "universe," "eternal," "ultimate," are unmeaning, or at best indicative of problems, not words to be lightly used in positive propositions. Mr. Wrench's phenomenalism is, in short, a very thinly-disguised materialism.

As philosophy, then, the book has no great merit. Nor can it be said greatly to extend or clarify our psychological knowledge. Mr. Wrench's fundamental classification—that of the instincts as self-preservative, reproductive, gregarious—is familiar, but it should not be accepted as final without strict examination. His notion of "sub-instinct," a specific form of one of the main instincts, as, e.g., patriotism is a specific gregariousness, is not without value, but it is scarcely conducive to clearness to apply this same term to the objective social custom which results from the interaction and mutual modification of the "forms the instincts take in the thought of the individual." Mr. Wrench's main practical inference from his analysis of human nature is that our present system of education should be inverted, and science given the predominant place, for, he says, "the process of abstraction is essentially gregarious." The intellectual fallacy in educational theory has been so often exposed that it is unnecessary to do more than notice this remarkable version of it.

In statement Mr. Wrench is clear and concise, and such purely scientific exposition as he gives in the course of his work is admirable.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

The Need of a Great Reference Library of Natural Science in London.

ANYONE desiring to see the new books in various branches of science who has had the use of the great libraries in Oxford or in Cambridge, and finds himself transferred to London as his habitation, must be astonished, as I have been, to find that there is no great scientific library in London, and that access to all the incomplete libraries of the various scientific societies does not enable him, even when he takes the large amount of trouble necessary to inquire at all of them, to see the important and necessary new books in various branches of work.

The deficiency is in regard to new "books" rather than in regard to periodicals. It must be noted that of late years, not only scientific periodicals, but large and costly separate scientific books or special memoirs, often expensively illustrated, have appeared, and are appearing, in increasing number. I could name several books in prehistoric archaeology, in comparative anatomy, and other subjects, which I have been unable to find in London within six months or a year of their publication, and others which are not likely to be purchased by any of our societies. The smaller societies devoted to special subjects have neither money nor house-room for a first-rate library. The larger societies neglect special subjects, on the theory that they are provided for by the special societies. The Royal Society has by no means such a library as might be expected in view of its age and dignity. It has insufficient funds and space, and, whilst aiming at completeness in periodicals and the publications of scientific societies, is a "broken reed" for one who leans on it as a help in the matter of books. It is true that the Linnean, the Zoological, the Geological, and the Chemical Societies, and the Society of Antiquaries have in their libraries many splendid books, and annually purchase a limited number of new books; but if their libraries are taken all together, in conjunction with that of the Royal Society, the Royal Medical Society, and the London Library, they do not

constitute that thing which is so necessary to the mature student of modern science, namely, a complete, or nearly complete, library of scientific publications, where the newest books may be seen and consulted as soon as published.

We are so behindhand in this matter that it is not possible in London even to see a new book from France or Germany with a view to its purchase. We ought to have in London a professedly *complete* library of modern scientific publications accessible to all mature students (whether on payment of subscription or otherwise), provided with a big reading-room where all the newest books can be seen and read. Such a library should not lend its books, but have them always ready for consultation. It should have a staff of really competent librarians able to help the reader to find what he wants, and it should be open until ten or eleven o'clock in the evening, and as late on Saturdays and all public holidays as on other days, for it is precisely at those hours when libraries are universally shut that a great number of eager students would find their only chance of using them.

It has been often suggested that such a library as I desire might be formed by the union and cooperation for this purpose of our various scientific societies, and I believe that might be so if a practical scheme were formulated. It would not be necessary for every society to give up its existing library, but it would be necessary for each society to contribute largely in money and books in order to constitute and maintain the new combined or central "consulting" library. Probably if the Government could be persuaded to give for this purpose the buildings formerly assigned to the University of London, and now occupied by the various examining bodies connected with the Civil Service and the Army, the National Scientific Reference Library could be at once constituted. In view of the urgent public necessity for such a library, the Government might be expected to provide a subsidy of two or three thousand pounds a year, and the scientific societies might contribute so much a head for their members and place their existing libraries at the service of the new institution without giving up their special rights to borrow certain books.

In order to make any further in the matter, it is clearly necessary to form, in the first place, an estimate of the minimum size of such a library and its reading-room, and of the annual expenditure necessary for the purchase of books, as well as for librarians, attendants, heating, and lighting.

I should be glad to receive any suggestions from those who feel the need of such a library. It seems to me that the essential points to be aimed at are:—(1) completeness, so that any and every book of scientific quality shall be on the table as soon as published; (2) accessibility of the library to readers until a late hour of the evening and on holidays and half-holidays, as well as on ordinary days.

The value of such a library to every kind of worker in science would be immense. It should be open to everyone on payment of a moderate annual subscription. It may be objected to any new library (such as I propose) that the library and reading-room of the British Museum supply the want. They do not, since books are not obtained there without delay. Many foreign books are not obtained there at all.

E. RAY LANKESTER.

Vapour-density and Smell.

IN a letter to NATURE of May 13 I made a statement to which Dr. Perman very naturally takes exception (May 27, p. 369). He cites ammonia, hydrocyanic acid, and hydrofluoric acid as instances of volatile bodies lighter than air, yet odorous. In considering the physiology of olfaction, however, certain conditions which might lead to misconception must be ruled out. In the first place, a very minute addition of impurity suffices to give odour to an otherwise odourless substance. Formalin was the substance of which I was writing. My judgment, based on sensory experience, absolutely declines to accept the somewhat fatty scent which I recognise with my nose close to a dish of formalin as a property of the vapour which irritates my conjunctiva when far beyond the range of